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ABSTRACT

This bulletin is one of four containing reprints of working papers used in developing the teacher performance specifications for the Georgia educational model for the preparation of elementary school teachers (ED 025 491). "Teacher performance specifications" are defined as descriptions of behaviors regarded by the Georgia study as essential characteristics (skills, attitudes, knowledges, etc.) for teachers if they are to adequately fulfill their professional obligation. An introductory section describes procedures which were used to obtain the specifications from three sources: desired pupil behaviors, established educational principles, and observation of teachers on-the-job. The worksheets for behaviors in arts and sciences include nine objectives for the elementary school natural science program, 13 for the mathematics program, 11 for the social studies program, eight for the art program, and 11 for the music program. Listed under each of the 52 objectives are several pupil learning behaviors, teaching behaviors, and the suggested specifications for a teacher education program. (JS)

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SPECIFICATION WORKSHEETS FOR BEHAVIORS IN THE ARTS AND SCIENCES

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Note: This bulletin reports one of a series of investigations designed to develop, evaluate and implement a model teacher education program for the preparation of elementary teachers. This report was prepared pursuant to a contract with the Office of Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy. This bulletin may not be reproduced without permission.

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Preface

This is one of a series of four related bulletins each of which contains reprints of working papers used in developing the teacher performance specifications for the Georgia educational model for the preparation of elementary school teachers (Johnson, Shearron, & Stauffer, Oct., 1968).

The original working papers (see list of references) are now out of print, and because of continuing interest of educators in the content of these papers this series of bulletins was prepared. The four bulletins were compiled by Drs. Gilbert F. Shearron and Charles E. Johnson and are entitled:

GEM Bulletin 69-19. Specification Worksheets for Language Arts Behaviors.

GEM Bulletin 69-20. Specification Worksheets for Behaviors in the Arts and Sciences.

GEM Bulletin 69-21. Specification Worksheets for Behaviors Drawn from Educational Principles.

GEM Bulletin 69-22. Specification Worksheets for Cognitive Processes and Affective Behaviors.

Teacher Performance Specifications

Teacher performance specifications are descriptions of behaviors regarded by the Georgia study as essential characteristics (skills, attitudes, knowledges, etc.) for teachers if they are to adequately fulfill their professional obligations. Part III of the report which presents the Georgia educational model (Johnson et al., Oct. 1968) contains classified lists of hundreds of these performance specifications which the authors regard as the core of the model. These specifications were drawn primarily from three basic sources: (a) desirable pupil behaviors, (b) established educational principles, and (c) observations of teachers on-the-job. The procedures used to obtain these specifications from the basic sources are described in detail in the aforementioned report (Johnson et al., Oct. 1968). The following discussion provides only a brief summary of these procedures, and the remainder of the bulletin presents the actual worksheets or working papers which were used.

Specifications Based on Desired Pupil Behaviors

The procedure for determining teacher performance specifications based on desired pupil behaviors began with a concensus of specialists regarding the goals of the elementary

school. Using these goals, elementary school objectives were determined in specific areas of learning. Next, educators examined these objectives and prepared descriptions of kinds of pupil learning behaviors that would guide the pupils in the direction of attaining the objectives. The pupil learning behaviors were then carefully examined by teams of professionals in order to determine the kinds of teacher teaching behaviors which would be necessary to effect the desired pupil behaviors. It was on the basis of these teaching behaviors that certain of the teacher performance specifications for the Georgia model were identified and classified.

Specifications Based on Educational Principles

The procedure for determining teacher performance specifications based on established educational principles began with a review of professional literature and consultation with specialists with a view toward establishing lists of what could be regarded as sound education principles. These were classified under three headings: instruction, learning, and organization. For each principle a teaching objective was created. For these teaching objectives lists of teacher teaching behaviors were developed. These in turn led to the

designing of additional teacher performance specifications for the model program.

Observations of the Teacher On-the-job

The two processes of obtaining teacher performance specifications summarized above were supplemented with specifications drawn from studies of teacher teaching behaviors on-the-job. The findings of these studies are summarized in Appendix A of the document containing the specifications (Johnson, et al., Oct. 1968), and are not summarized in any bulletins.

SPECIFICATION WORKSHEETS FOR

BEHAVIORS IN NATURAL SCIENCE

Objectives for the Elementary School

Natural Science Program

1. To acquire an understanding of the following generalization: The progress made in technology and science, even though the goals of these two fields of human enterprises are different, depends upon the interaction between the activities conducted in both fields.

2. To acquire an understanding of the following generalization: Living organisms are adapted, or have modifications, for survival in a particular environment. (Broad conceptual scheme: Living organisms are in continuous interaction with one another and with their environment.)

3. To acquire an understanding of the following generalization: The surface of the earth is continually changing. (Broad conceptual scheme: All matter, living and non-living, undergoes some degree of change in time.)

4. To acquire an understanding of the following generalization: Living organisms go through a series of stages in their development. (Broad conceptual scheme: All matter, living and non-living, undergoes some degree of change in time.)

5. To acquire an understanding of the following generalization: Animals and plants depend on each other in many ways. (Broad conceptual scheme: Living organisms are in continuous interaction with one another and with their environment.)

6. To acquire an understanding of the following generalization: Man's concept of the solar system has undergone many revisions and modifications.

7. To distinguish among the senses and relate these distinctions to properties in an object in the environment.

8. To refine his observations and present them in terms of some system of symbolism.

9. To develop a method for expanding his knowledge or understanding of scientific concepts.

Objective #1

To acquire an understanding of the following generalization: The progress made in technology and science, even though the goals of these two fields of human enterprise are different, depends upon the interaction between the activities conducted in both fields.

Pupil learning behaviors

1. The child explains how the desired goal for the activities of technicians can lead to the necessity of first securing new knowledge by scientists.

2. The child explains how knowledge produced in science has been applied or "put to use" by men in technology.

3. The child identifies historical cases that illustrate how the activities of technology and science are interdependent.

4. The child describes present day attempts of technology to apply scientific knowledge.

Teaching behaviors

1. The teacher provides opportunities for children to study the advancements made in various fields of technology--for example, communication and transportation--as a result of knowledge derived by scientists.

2. The teacher provides opportunities for children to study how the attempts of men in technology have been delayed or interrupted because of the lack of scientific knowledge.

3. The teacher provides opportunities for children to collect information that illustrates that the research conducted in both technology and science is done very carefully.

4. The teacher provides opportunities for children to speculate on how progress in science and technology may influence how they live in the future.

Objective #2

To acquire an understanding of the following generalization: Living organisms are adapted, or have modifications, for survival in a particular environment. (Broad conceptual scheme: Living organisms are in continuous interaction with one another and with their environment.)

Pupil learning behaviors

1. The child explains why certain kinds of organisms may survive only in a given environmental setting. (For example, why can fish only live in water.)

2. The child identifies modifications, or adaptations, of animals and plants which enable the organisms to survive in certain environmental setting.

3. The child infers what may happen to a living organism if it is transferred from one environmental setting to a different kind of environmental setting.

4. The child explains how he is adapted for living under certain conditions.

Teaching behaviors

1. The teacher provides opportunities for children to observe and contrast the structure of plants and animals.

2. The teacher provides opportunities for children to investigate the growth of plants under different environmental conditions.

3. The teacher provides opportunities for children to group (classify) plants and animals on the basis of adaptive modifications.

Objective #3

To acquire an understanding of the following generalization: The surface of the earth is continually changing. (Broad conceptual scheme: All matter, living and non-living, undergoes some degree of change in time.)

Pupil learning behaviors

1. The child explains the processes by which erosion and weathering alter the earth's surface.

2. The child describes ways in which mountains are continually being formed, as well as being continually worn down.

3. The child identifies possible causes of existing land formations and structures.

4. The child describes changes of the earth's surface that have occurred in the past and indicates changes that may occur in the future.

Teaching behaviors

1. The teacher provides opportunities for children to investigate how erosion and weathering alters the surface of the earth.

2. The teacher provides opportunities for children to collect information on the changes of the earth's surface that are "historical" in nature.

3. The teacher provides opportunities for children to observe and compare existing land formations and structures.

4. The teacher provides opportunities for children to collect information that illustrates both "rapid" and "slow" changes of the earth's surface.

Objective #4

To acquire an understanding of the following generalization: Living organisms go through a series of stages in their development. (Broad conceptual scheme: All matter, living and non-living, undergoes some degree of change in time.)

Pupil learning behaviors

1. The child identifies the stages of development of an insect that undergoes the process of metamorphosis.

2. The child describes the stages of the life cycle of a frog.

3. The child explains the importance of pollination and seed germination to the life cycle of a plant.

4. The child indicates the various stages of development that he, as a human, has already undergone and will undergo in the future.

Teaching behaviors

1. The teacher provides opportunities for children to observe the stages of development of a variety of plants and animals.

2. The teacher provides opportunities for children to contrast the differences in the stages of development among animals and among plants.

3. The teacher provides opportunities for children to predict what may happen if the normal sequence in the stages of development of a living organism does not occur.

4. The teacher provides opportunities for children to investigate the conditions necessary for the stages of development to occur for different plants and animals and the time it takes for the stages of development to be completed for different plants and animals.

Objective #5

To acquire an understanding of the following generalization: Animals and plants depend on each other in many ways. (Broad conceptual scheme: Living organisms are in continuous interaction with one another and with their environment.)

Pupil learning behaviors

1. The child identifies ways in which animals depend upon plants for survival. (For example, animals depend upon plants for their food.)

2. The child explains the role of animals in the pollination process and in seed dispersal.

3. The child infers what may be the consequences if one "link" of a particular food chain is broken or if the food chain is altered in some way.

4. The child describes how non-green plants depend on other plants and animals for survival.

Teaching behaviors

1. The teacher provides opportunities for children to collect and classify seeds according to how they are dispersed.

2. The teacher provides opportunities for children to trace the results of food chains that have been altered or broken.

3. The teacher provides opportunities for children to investigate the conditions under which plants that cannot make their own food are able to survive.

4. The teacher provides opportunities for children to construct and maintain an aquarium and vivarium.

Objective #6

To acquire an understanding of the following generalization: Man's concept of the solar system has undergone many revisions and modifications.

Pupil learning behaviors

1. The child identifies and describes man's early concept of the structure of the solar system.

2. The child explains how the development of new instruments has led to new discoveries about the solar system.

3. The child identifies recent modifications of man's knowledge about the solar system, as well as some ideas about the solar system that are being questioned.

4. The child recognizes the "tentativeness" of man's knowledge of the solar system.

Teaching behaviors

1. The teacher provides opportunities for children to investigate and contrast past and present interpretations of the solar system made by man.

2. The teacher provides opportunities for children to study the ways in which man tried to explain the solar system prior to the emergence of science.

3. The teacher provides opportunities for children to gather information regarding questions of the solar system that man is now trying to solve and the ways in which the questions may be solved.

4. The teacher provides opportunities for children to study the instruments, mathematics, and other skills used to make interpretations about the solar system.

Objective #7

To distinguish among the senses and relate these distinctions to properties in an object in the environment.

Pupil learning behaviors

1. The child observes objects and distinguishes between or among them using such properties as: color, size, weight, shape, odor, texture, sound, phase, and taste.

2. The child distinguishes among or between objects when the actual object is not observed, but some representation of the object is presented.

3. The child compares objects in terms of their position and observable properties.

Teaching behaviors

1. The teacher provides opportunities for children to observe properties of matter using all senses.

2. The teacher provides opportunities for children to compare the properties of matter.

3. The teacher provides representations of objects for comparison of properties.

4. The teacher withholds value judgments of children's observations

Objective #8

To refine his observations and present them in terms of some system of symbolism.

Pupil learning behaviors

1. The child refines his observations using techniques and instruments.

2. The child uses some standardized system of measurement.

3. The child uses mathematical symbols to communicate his observations.

Teaching behaviors

1. The teacher provides opportunities for children to use instruments in making their observations.

2. The teacher instructs the children in the use of techniques that will result in refined observations.

3. The teacher provides opportunities for children to select some standardized system for measurement.

4. The teacher provides opportunities for children to express their observations in some system of symbolism.

Objective #9

To develop a method for expanding his knowledge or understanding of scientific concepts.

Pupil learning behaviors

1. The child defines a problem and designates some facets of the problem.

2. The child plans methods of obtaining additional information relative to the problem.

3. The child organizes data into some meaningful pattern to contribute to his field of knowledge or to answer his questions.

Teaching behaviors

1. The teacher provides opportunities for children to recognize scientific problems.

2. The teacher refrains from interfering with a student investigation once a problem is defined.

3. The teacher acts as a consultant for the investigating children.

4. The teacher can supply background information or provide sources of information (scientific) when the need arises.

SPECIFICATION WORKSHEETS FOR BEHAVIORS IN MATHEMATICS

Objectives for the Elementary School Mathematics Program

1. To recognize relationships among natural or social phenomena and mathematical notation, concepts, definitions, and facts in a child's environment.

2. To use basic algorithms.

3. To use numerical relations.

4. To use geometrical relations.

5. To make geometrical constructions and drawings and to use these in the child's environment.

6. To use the processes of measurement.

7. To use mathematical structures.

8. To comprehend selected aspects of the nature of mathematics.

9. To comprehend selected topics in number theory.

10. To use the idea of ratio.

11. To make applications of concepts of probability and statistics.

12. To comprehend the basic concept of limits.

13. To make logical arguments.

Objective #1

To recognize relationships among natural or social phenomena and mathematical notation, concepts, definitions, and facts in a child's environment.

Pupil learning behaviors

1. The pupil makes mathematical abstractions or models of the physical world.

2. The pupil translates written or verbal problems to mathematical statements.

3. The pupil, given a set of data from a real world, formulates the data into a mathematical model.

4. The pupil displays a spatial representation of a real world.

5. The pupil mediates his environment through concept of number.

Teaching behaviors

1. The teacher presents situations from a real world and leads the children in making mathematical abstractions or models from these situations.

2. The teacher chooses relevant problems and assists the child in forming mathematical statements in order to more easily solve the given problem (e.g., "flow-charting" techniques).

3. The teacher leads the child in an instructional sequence in which the children formulate real world data into mathematical models.

4. The teacher presents models of spatial representations of a real world.

5. The teacher uses examples from the child's environment to illustrate concept of number.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of effective methodological procedures.

2. Knowledge of relationships of real world phenomena and mathematics.

3. Knowledge of history of mathematics.

Objective #2

To use basic algorithms

Pupil learning behaviors

1. The pupil computes within a number system efficiently.

2. The pupil applies the basic laws of arithmetic in computational techniques.

3. The pupil uses algorithms in solving problems.

4. The pupil performs certain algorithms independently of the numeration system being used.

5. The pupil justifies why he uses a certain algorithm for a specific situation.

Teaching behaviors

1. The teacher leads the child, through instructional techniques, from a basic computational method to a more efficient computational method.

2. The teacher leads the child in comprehending a basic set of laws of arithmetic as they apply to computational techniques.

3. The teacher provides opportunities from real world situations in which the child can use algorithms in problem solving.

4. The teacher presents and uses examples to demonstrate algorithms in other number bases.

5. The teacher provides opportunities for the child to choose different algorithms for different computational situations.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of the structure of the real number system.

2. Knowledge of algorithms.

3. Knowledge of numeration systems.

4. Knowledge of appropriate teaching strategies.

Objective #3

To use numerical relations.

Pupil learning behaviors

1. The pupil constructs equivalence classes of fractions.
2. The pupil works with equality.
3. The pupil orders the whole numbers.
4. The pupil orders the rational numbers.
5. The pupil finds a rational number between any two given rational numbers.

Teaching behaviors

1. The teacher presents the idea of equivalence class.
2. The teacher creates problems involving equality.
3. The teacher leads the child in an instructional sequence in the concept of order of rational numbers.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of equivalence relations.
2. Knowledge of order relations.
3. Knowledge of the real number field.
4. Knowledge of the integral domain of integers.
5. Knowledge of appropriate teaching strategies.
6. Knowledge of Piaget's "The Child's Conception of Number."

Objective #4

To use geometrical relations.

Pupil learning behaviors

1. The pupil uses the concept of congruency.

2. The pupil uses the concept of similarity.

3. The pupil classifies geometrical figures according to congruency (similarity).

4. The pupil works with geometrical transformations.

5. The pupil determines interrelationships among geometrical figures.

Teaching behaviors

1. The teacher demonstrates the conditions that establish congruency.

2. The teacher demonstrates the conditions that establish similarity.

3. The teacher presents stimuli in the form of geometrical figures in such a way that the child makes classifications according to congruency (similarity).

4. The teacher establishes within the child the relationships among physical phenomena and geometrical transformations.

5. The teacher leads the child in instructional sequences in such a manner that child determines interrelationships among geometrical figures.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of congruency.

2. Knowledge of similarity.

3. Knowledge of the basic rigid motions in the Euclidean plane.

4. Knowledge of plane Euclidean geometry and non-Euclidean geometries.

5. Knowledge of appropriate teaching strategies.

6. Knowledge of Piaget's "The Child's Conception of Geometry."

Objective #5

To make geometrical constructions and drawings and to use these in the child's environment.

Pupil behaviors

1. The pupil constructs reflections.
2. The pupil draws convex sets.
3. The pupil constructs perpendicular bisectors for any given line segment.
4. The child constructs polygons.
5. The child draws tangents to a circle.

Teaching behaviors

1. The teacher demonstrates the construction of a reflection.
2. The teacher instructs the child in the concept of convex sets.
3. The teacher clarifies the principle of perpendicularity.
4. The teacher differentiates between polygons and polygonal regions.
5. The teacher presents models which exemplify the concept of a tangent to a circle.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of geometries (Euclidean and non-Euclidean).
2. Knowledge of effective methodology for leading children in making geometric constructions and drawings.
3. Knowledge of appropriate teaching strategies.
4. Knowledge of Piaget's "The Child's Conception of Space."

Objective #6

To use the processes of measurement.

Pupil learning behaviors

1. The pupil applies the concept of the inner and outer measure to closed geometrical regions.

2. The pupil determines successive approximations to the measure of a closed region.

3. The child applies the concept of unit of measure.

4. The child uses the transitive property of order relations in measurement.

5. The child uses the additive property of measure, e.g., length, volume, area, etc.

Teaching behaviors

1. The teacher leads the child through experimentation to the concept of inner and outer measure.

2. The teacher leads the child through the employment of various units of measure to arrive at successive approximations for the measure of a closed region.

3. The teacher directs the child in creating his own unit of measure.

4. The teacher demonstrates the transitive property of order relations in measurement.

5. The teacher leads the child in an instructional sequence for using the additive property of measure.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. An introduction to real analysis.

2. Knowledge of processes of measure.

3. Knowledge of appropriate teaching strategies.

Objective #7

To use mathematical structures.

Pupil learning behaviors

1. The pupil organizes his mathematical concepts into structure, e.g., modulo five.

2. The pupil identifies the elements of the structure for any given number system.

3. The pupil identifies the elements of structure for Euclidean geometry.

4. The pupil applies structure in solving mathematical problems.

5. The pupil relates algebraic and geometrical structures.

Teaching behaviors

1. The teacher develops a modulo six system.

2. The teacher develops instructional sequences which leads the child into the identification of the structural elements for any given number system.

3. The teacher utilizes various finite geometrical systems to clarify the structure of Euclidean geometry.

4. The teacher creates the opportunity for the child to make applications of the mathematical structure which has been developed.

5. The teacher demonstrates interrelationships between algebra and geometry.

Suggested specifications for a teacher education program:

A teacher education program will provide the student with:

1. Knowledge of congruency, modulo.

2. Knowledge of the standard development of the real number system.

3. Knowledge of geometries, Euclidean and non-Euclidean.

4. Knows the relationships between mathematical structure and various physical and/or man-made phenomena.

5. Knowledge of algebra.

6. Knowledge of appropriate teaching strategies.

Objective #8

To comprehend selected aspects of the nature of mathematics.

Pupil Learning behaviors

1. The pupil comprehends that mathematics is man made.
2. The pupil comprehends the relationship of mathematics to the real world.
3. The pupil comprehends mathematical methods.
4. The pupil comprehends the arithmetization of analysis.
5. The pupil comprehends the interrelationships among the various branches of mathematics.

Teaching behaviors

1. The teacher leads the child into the notion that he, the child, is able to create mathematics.
2. The teacher presents mathematics as a living endeavor.
3. The teacher leads the child into an axiomatization of the whole numbers.
4. The teacher leads the child into the construction of the rational numbers of arithmetic from the whole numbers.
5. The teacher presents mathematics in a manner such that the child comprehends the relationship between the rational numbers and geometry via the processes of measurement.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of the nature of mathematics.
2. The ability to relate mathematics to a real world.
3. An understanding of mathematical methods.
4. Knowledge of the real number system.
5. An understanding of the interrelationship among the various branches of mathematics.
6. Knowledge of appropriate teaching strategies.

Objective #9

To comprehend selected topics in number theory.

Pupil learning behaviors

1. The pupil constructs a set of prime numbers.

2. The pupil factors a composite number into its prime factors.

3. The pupil represents algebraically odd and even numbers.

4. The pupil uses basic divisibility rules.

5. The pupil identifies numbers that are relatively prime.

Teaching behaviors

1. The teacher leads the child in the activity of identifying and listing prime numbers.

2. The teacher demonstrates the Sieve of Eratosthenes to identify, define, or demonstrate prime numbers and composite numbers.

3. The teacher directs the child in the process of factoring any given composite number.

4. The teacher leads the child in the use of basic divisibility rules.

5. The teacher presents examples of numbers that are relatively prime and examples that are not relatively prime, and leads the child to discover the reasons for the relationship.

6. The teacher demonstrates the usefulness of number theory in the construction of computational algorithms.

Suggested specifications for a teacher education program

A teacher education program will provide a student with:

1. Knowledge of elementary number theory.

2. Knowledge of appropriate teaching strategies.

Objective #10

To use the idea of ratio.

Pupil learning behaviors

1. The pupil constructs graphs for a given ratio.
2. The pupil constructs equivalance classes for a given ratio.
3. The child adds ratios.
4. The child makes applications of ratio to a real world.
5. The child uses cross-product to determine equivalent ratios.

Teaching behaviors

1. The teacher illustrates graphs for a given ratio.
2. The teacher leads the child to construct equivalence classes for a given ratio.
3. The teacher presents situations in which the child discovers vector addition as an abstraction of a real world problem involving the addition of ratios.
4. The teacher creates conditions so that the child may apply ratio to a real world.
5. The teacher uses examplification with justification to lead the child in using cross-product to determine equivalent ratios.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of a vector space.
2. Knowledge of linear subspace of a vector space.
3. A set of real world examples relating to ratio.
4. Knowledge of appropriate teaching strategies.

Objective #11

To make applications of concepts of probability and statistics.

Pupil learning behaviors

1. The pupil determines probabilities of simple events through experimentation.

2. The pupil determines probabilities of compound events.

3. The pupil uses the additive property of probability.

4. The pupil uses the concept of random variable.

5. The child constructs probabilistic models of appropriate real world problem situations.

Teaching behaviors

1. The teacher leads the child in conducting experiments so that the child determines the probability of a simple event.

2. The teacher creates conditions that the child uses in determining the probability of a compound event.

3. The teacher exemplifies the use of the additive property in determining probabilities.

4. The teacher leads the child to recognize the concept of random variable.

5. The teacher leads the child in an instructional sequence of determining the mean of a random variable.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of basic probability and statistics.

2. Knowledge of a large set of models for use in experimentation activities.

3. Knowledge of appropriate teaching strategies.

Objective #12

To comprehend the basic concept of limits.

Pupil learning behaviors

1. The pupil applies the limit concept in successive approximations to measure a special region.
2. The pupil works with partial sums of series (e.g., successive approximations using decimal forms).
3. The pupil works with divergent sequences (e.g., whole numbers).
4. The pupil works with convergent sequences (e.g., 1, ½, ¼, ... $\frac{1}{2^n}$, ...).
5. The pupil makes applications of the concept of limits to a real world.

Teaching behaviors

1. The teacher leads the child by an inductive process to the existance of a measure of a special region.
2. The teacher leads the child by exemplification in the partial sums of series.
3. The teacher leads the child by exemplification to comprehend divergent sequences.
4. The teacher leads the child by exemplification to comprehend convergent sequences.
5. The teacher presents situations from a real world that exemplify the concept of limit.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of limits, sequences, and series.
2. Knowledge of a set of real world examples illustrating the ideas of limits, sequences, and series.
3. Knowledge of appropriate teaching strategies.

Objective #13

To make logical arguments.

Pupil learning behaviors

1. The pupil uses syllogistic reasoning.

2. The pupil makes applications of class logic to a real world.

3. The pupil uses logical connectives.

4. The pupil distinguishes between valid and invalid arguments.

5. The pupil, given a statement, determines its truth value by logical argument.

Teaching behaviors

1. The teacher demonstrates examples of syllogistic reasoning.

2. The teacher offers opportunities from real world phenomena so that the child makes application of class logic.

3. The teacher leads the child to recognize, in his own language patterns, logical connectives.

4. The teacher presents valid or invalid arguments to the child so that the child may test the arguments.

5. The teacher aids the children in constructing logical arguments which establishes the truth value of a given statement.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of modern symbolic logic.

2. Knowledge of Boolean Algebra.

3. Knowledge of Piaget's "The Language and Thought of the Child."

4. Knowledge of methods of proof.

5. Knowledge of appropriate teaching strategies.

SPECIFICATION WORKSHEETS FOR

BEHAVIORS IN SOCIAL STUDIES

Objectives for the Elementary School

Social Studies Program

1. To demonstrate the method of the social scientist in the collection, interpretation, and use of first hand data (primary sources).

2. To demonstrate an understanding of historical time (past, present, and future).

3. To appreciate people with other mores, beliefs, languages, customs, governments, and environmental conditions, etc.

4. To recognize the role of the past in the development of the present and future.

5. To recognize the relation existing between environmental conditions and human progress.

6. To recognize the importance of human relations, the interaction of people with people, and nation with nation.

7. To apply principles of human relations in various group situations so as to contribute effectively toward both achieving group goals and increasing group satisfaction.

8. To understand the role of government, political parties, and civic responsibility.

9. To differentiate basic principles of democracy and identify manifestations of these principles in American society.

10. To understand and use processes, techniques, and basic skills appropriate to different areas of social studies to solve social problems.

11. To identify vital relationships between significant social factors and forces and artistic achievements and scientific developments which represent important cultural advances.

Objective #1

To demonstrate the method of the social scientist in the collection, interpretation, and use of first hand data (primary sources).

Pupil learning behaviors

1. The child seeks out primary sources for data such as, interviewing older residents about the history of his community, visiting historical museums, and examining photographs.

2. The child applies principles of external and internal criticism to his data collection.

3. The child interprets and presents his findings appropriately.

4. The child uses, tabulates, and interprets, survey materials such as the questionnaire.

5. The child participates in experiments to determine the effectiveness of a procedure.

6. The child collects and analyzes data in an experiment to determine the effectiveness of a procedure.

7. The child plans an experiment to determine the effectiveness of a procedure.

Teaching behaviors

1. The teacher provides opportunities in which the pupil works with primary source materials.

2. The teacher guides children in examining data for authenticity and helps him in making comparisons with other sources.

3. The teacher guides the pupils in interpreting and presenting their findings.

4. The teacher introduces the pupils to the experimental method of the social scientist and provides situations for its application.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of the historical, descriptive, and experimental methods of data collection, interpretation, and use.

2. Skill in setting up situations in which children can work with primary source materials.

3. Skill in evaluating the pupil's collection, interpretation, and use of first hand data.

Objective #2

To demonstrate an understanding of historical time (past, present, and future).

Pupil learning behaviors

1. The child classifies events in terms of a historical framework.

2. The child identifies events significant to the development of societies and cultures.

3. The child explains various time concepts such as minute, ancient, century, etc.

4. The child figures the amount of time between today and given past events.

Teaching behaviors

1. The teacher uses present events as a vehicle to introduce and develop common time concepts.

2. The teacher identifies events significant to the development of societies and cultures.

3. The teacher guides pupils to perform certain tasks related to acquiring an understanding of basic time concepts.

4. The teacher observes pupil responses and assesses their progress in relation to understanding basic time concepts.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of basic concepts of time.

2. Knowledge of significant historical events.

3. Knowledge of and ability to determine and set up relevant performance tasks.

4. Ability to use significant events in setting up a time line.

5. Ability to devise evaluation procedures to determine children's understanding of historical time.

6. Ability to select relevant experiences and materials.

Objective #3

To appreciate people with other mores, beliefs, languages, customs, governments and environmental conditions, etc.

Pupil learning behaviors

1. The child identifies individuals with different mores, beliefs, languages, etc. in his own social world.

2. The child recognizes people with different mores, beliefs, etc. in societies other than his own.

3. The child compares his society with other societies in terms of similarities and differences.

4. The child detects factors that contribute to these differences.

5. The child accepts others with different mores, beliefs, etc.

6. The child feels empathy toward others having different mores, beliefs, etc.

7. The child discovers the vastness of the similarities existing between all men in spite of their differences.

Teaching behaviors

1. The teacher demonstrates an acceptance of others and a willingness to help all students.

2. The teacher guides children in understanding and accepting others.

3. The teacher creates situations in which pupils have the opportunity to interact with those different than themselves.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of cultures--his own as well as others.

2. Ability to organize groups to facilitate learning, acceptance, and understanding of others.

3. Knowledge of diagnostic instruments (sociograms, etc.) to determine student attitudes toward each other.

Objective #4

To recognize the role of the past in the development of the present and future.

Pupil learning behaviors

1. The child defines the concepts--past, present, and future.

2. The child identifies significant relationships existing between a set of past aspects and an aspect found in the present environment and between a given present aspect and a future development.

3. The child expresses several hypotheses to predict alternative forms of potential future developments.

4. The child discovers that societies are forever in the process of evolution.

5. The child recognizes that his own behavior in the present will affect his life in the future.

Teaching behaviors

1. The teacher communicates to pupils information relating to concepts of historical time (past, present, and future) and the relationship of past to present and present to future.

2. The teacher directs pupils in the performance of certain tasks related to acquiring an adequate understanding of these concepts and principles in his classroom operations.

3. The teacher demonstrates for pupils an adequate understanding of and an ability to use these concepts and principles in his classroom operations.

4. The teacher observes pupils' performance of the various tasks and determines their progress in relation to acquiring the desired understandings.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of basic concepts of historical time and their interrelationship.

2. Ability to intelligently predict on the basis of the past probabilities for the future.

3. Skill in applying the principles of historical interrelationships to actual classroom situations.

4. Ability to apply knowledge of basic historical concepts and principles in a variety of situations and ways.

5. Skill in observing pupils' responses and assessing their progress in acquiring understanding of historical interrelationships.

Objective #5

To recognize the relation existing between environmental conditions and human progress.

Pupil learning behaviors

1. The child locates places on maps and globes.

2. The child interprets maps and globes.

3. The child understands the relation existing between climatic and economic conditions.

4. The child recognizes that differences in mores, beliefs, languages, customs, and governments usually result from environmental situations.

5. The child predicts from a set of environmental conditions a probable way of life.

6. The child determines the reasons why some areas of the world are more "progressive" than others.

7. The child discovers that people generally are the products of their environments and experiences.

8. The child recognizes the reasons behind the development of social, political, religious, and economic systems.

Teaching behaviors

1. The teacher shows children how to use and interpret maps and globes.

2. The teacher acquaints children with other tools used by geographers.

3. The teacher helps children to discover relationships between a given way of life and environmental conditions.

4. The teacher guides children in recognizing the role of environment and experience in the development of both individuals and societies.

5. The teacher guides children in predicting a way of life when given a description of environmental conditions.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of the role of environment in the growth of the individual.

2. Knowledge of climatic conditions and their affect on the development of a way of life.

3. Knowledge of geographic space and the tools of geography.

4. Knowledge of various social, political, economic, and religious systems.

5. Skill in guiding children to see relationships between environment and progress.

6. Skill in determining children's understanding of the role of environment in human progress.

7. Knowledge of individual differences and the reasons for their existence.

8. Knowledge needed in order to predict from environmental conditions a probable way of life.

Objective #6

To recognize the importance of human relations, the interaction of people with people, and nation with nation.

Pupil learning behaviors

1. The child understands such concepts as cross-cultural, interdependence, interaction, and cooperation.

2. The child recognizes the impact of culture on ways of thinking, believing, and acting.

3. The child discovers the importance of open-mindness and concern for others, especially when dealing with differences in ways of living, believing, etc.

4. The child realizes the importance of effective communication in today's world.

5. The child deals with change and recognizes the role of communication in producing change.

6. The child values himself and others.

7. The child understands the reason (and value) of individual differences.

8. The child discovers that his world is effected by the relation of people to people, nation to nation.

Teaching behaviors

1. The teacher values and is willing to help each individual pupil.

2. The teacher helps the children to communicate with her and with other pupils.

3. The teacher provides situations in which children can discover the importance of effective communication.

4. The teacher provides situations in which children can discover the problems involved in communicating with one another.

5. The teacher helps pupils to understand that their world is an interdependent, not isolated world.

6. The teacher helps pupils to become sensitive to one another.

7. The teacher helps pupils to see the value and need for individual differences.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of the reason for individual differences.

2. Knowledge of other cultures.

3. Knowledge of the interdependence existing between other nations and peoples of the world.

4. Knowledge of the reasons for and the process of change and the role of human relations in this process.

5. Knowledge of such concepts as cross-cultural, etc.

6. Skill in setting up experiences in which pupils can view themselves in relation to others.

7. Skill in setting up experiences in which pupils can discover both the importance of and the difficulties involved in the communication process.

8. Skill in setting up experiences in which pupils can discover the importance of and the difficulties involved in effective human relations.

9. Knowledge of group dynamics, sensitivity to others, etc.

Objective #7

To apply principles of human relations in various group situations, so as to contribute effectively toward both achieving group goals and increasing group satisfaction.

Pupil learning behaviors

1. The child distinguishes various personal values and points of view expressed by different members of a group.

2. The child communicates personal values and points of view effectively.

3. The child listens courteously as others express their personal values and points of view and displays an attitude of openness toward those who hold different values and ideas.

4. The child cooperates with various group members by giving help to others and accepting help from others.

5. The child diagnoses both individual and group problems in group situations.

6. The child differentiates group leader and member roles and varies behaviors depending on the role he is assigned.

7. The child accepts consensus and compromise as basic procedures for settling group problems and abides by decisions made on the basis of these procedures.

Teaching behaviors

1. The teacher establishes various group situations whereby pupils may interact with other pupils to achieve common goals.

2. The teacher creates conditions which will enable groups to choose their own methods and set their own pace in attacking problems.

3. The teacher encourages pupils to assume different roles and assists them to discharge the tasks associated with these roles.

4. The teacher provides information, materials, and media as the need for supplementary support arises.

5. The teacher demonstrates the desired behaviors by using human relation principles in guiding the pupils to participate in group situations.

6. The teacher observes pupils' performance and assesses their progress in relation to acquiring the desired outcomes.

7. The teacher summarizes with pupils' aid the learned principles and introduces situations for further application.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of relevant principles of human relations and an ability to set expectations and communicate preparatory information related to these principles.

2. Knowledge of techniques of human relations and an ability to guide students to participate in group situations.

3. Knowledge of relevant training tasks and resources and ability to initiate activities utilizing them at appropriate times.

4. Knowledge of observational and assessment techniques and ability to use these techniques in evaluating pupil performance.

5. Knowledge of group situations requiring more advanced skills in human relations and ability to help pupils to relate present learning to the next level of learning in this area.

Objective #8

To understand the role of government, political parties, and civic responsibility.

Pupil learning behaviors

1. The child distinguishes various levels of government and describes their unique and shared responsibilities.

2. The child identifies major political parties and recognizes both their basic function and significant differences.

3. The child defines civic responsibility and cites illustrations of it found in daily life.

4. The child discovers that governments consist of political candidates who are elected by individual citizens.

5. The child recognizes that his political choices have important consequences for governments, political parties, and individual citizens.

Teaching behaviors

1. The teacher communicates to pupils vital information relating to the role of government, political parties, and civic responsibility.

2. The teacher establishes and guides pupils to perform tasks related to acquiring concepts and principles basic to understanding the above elements.

3. The teacher provides relevant resources when needed to further activities or understanding.

4. The teacher demonstrates an adequate understanding of these elements by using them properly to discuss and/or analyze political events.

5. The teacher observes pupils' performance in this area and assesses their progress in this area.

6. The teacher summarizes, with students' aid, the major points and presents situations for extended application.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of the role of government, etc. and an ability to set expectations and to communicate essential preparatory information.

2. Knowledge of points of interrelation among these levels of political activity and an ability to present instances which illustrate these points.

3. Knowledge of relevant training tasks and resources and an ability to initiate activities involving these tasks and resources at appropriate times.

4. Knowledge of observational and assessment techniques and an ability to use these techniques to evaluate pupil performance.

5. Knowledge of more complex instances of these elements and an ability to assist pupils to apply learned understanding to these instances.

Objective #9

To differentiate basic principles of democracy and identify manifestations of these principles in American society.

Pupil learning behaviors

1. The child defines such basic principles of democracy as respect for the individual, valuing of diversity, freedom of speech, equality of opportunity, government of, by, and for the people, etc.

2. The child recognizes that these principles are ideals to be continuously pursued.

3. The child cites instances from daily life which represent concrete applications of these principles.

4. The child distinguishes various levels of application (e.g., in terms of belief only or in terms of both belief and behavior).

5. The child evaluates observed or described situations to determine the extent to which these principles are applied.

6. The child compares and evaluates various historical interpretations of these principles.

7. The child evaluates personal beliefs and behavior to determine the extent to which it is consistent with these principles.

8. The child describes desired personal and group behaviors which should occur in a society where these principles are valued.

9. The child discovers that people may express belief in these principles and yet, behave in ways that contradict the ideals reflected in their beliefs.

10. The child explains some factors which influence people to operate in this manner.

Teaching behaviors

1. The teacher communicates to pupils information relevant to beginning a study of these principles.

2. The teacher establishes related activities and tasks for pupils and guides them in participating in these activities and tasks.

3. The teacher demonstrates for pupils an adequate understanding of these principles by using them properly.

4. The teacher provides appropriate resources when needed to further activities or understandings.

5. The teacher observes pupils' performance in the various activities and tasks and assesses their progress in this area.

6. The teacher summarizes, with pupils' assistance, the understandings and processes investigated and introduces information related to the next area of development.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of basic principles of democracy and an ability to set expectations and communicate preparatory information related to democratic principles.

2. Knowledge of the different levels of application and an ability to present situations which illustrate these different levels.

3. Knowledge of relevant training tasks and resources and an ability to initiate activities utilizing them at appropriate times.

4. Knowledge of observational and assessment techniques and an ability to use these techniques to evaluate pupil development in these areas.

5. Knowledge of more complex instances of these principles and an ability to stimulate pupils to apply learned understanding and processes to these instances.

Objective #10

To understand and use processes, techniques, and basic skills appropriate to different areas of social studies to solve social problems.

Pupil learning behaviors

1. The child identifies various types of basic social problems for investigation.

2. The child generates set of questions appropriate to the context of the problem situation.

3. The child selects a set of inquiry techniques from a related area of study (history, geography, economics, sociology, political science, etc.) and applies appropriate research skills to investigate a problem situation.

4. The child formulates some explanatory or experimental hypotheses for investigating a particular problem.

5. The child sets up an investigative strategy for collecting data to verify the proposed hypotheses.

6. The child collects data from printed, graphic, and real life sources and synthesizes it into a descriptive framework

7. The child interprets the data and draws a set of related conclusions on the basis of the findings.

8. The child presents essential findings and conclusions to others in a written or oral form using charts, graphs, maps, and tables where appropriate.

Teaching behaviors

1. The teacher presents information relating to controversial issues or critical social incidents and raises exploratory questions.

2. The teacher encourages pupils to choose a problem area and to identify a basic question or hypothesis to be investigated.

3. The teacher sets up conditions which will enable pupils to propose an investigative strategy.

4. The teacher provides information, materials, and media to aid pupils to conduct a systematic investigation of a problem area.

5. The teacher observes and assesses pupil's performance to determine their progress toward mastery of the desired processes, techniques, and skills.

6. The teacher summarizes with pupils' aid the major points and presents more complex situations for further application.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of relevant social studies' investigative processes, techniques, and skills and an ability to set expectations and communicate essential preparatory information.

2. Knowledge of different investigative strategies (historical, geographical, behavioral science) and an ability to guide pupils to engage in these strategies.

3. Knowledge of relevant training tasks and resources and ability to initiate activities involving these tasks and resources at appropriate times.

4. Knowledge of observational and assessment techniques and ability to use these techniques to evaluate pupil performance.

5. Knowledge of more complex social problem areas and ability to assist pupils to apply learned processes, techniques, and skills to these areas.

Objective #11

To identify vital relationships between significant social factors and forces and artistic achievements and scientific developments which represent important cultural advances.

Pupil learning behaviors

1. The child detects significant factors and forces which function as basic determinants during different historical periods.

2. The child detects major artistic achievements and scientific developments which represent important cultural advances.

3. The child advances explanatory hypotheses to establish a vital point of relationship between a given set of factors and/or forces and a set of artistic achievements and/or scientific developments.

4. The child discovers that the consequences produced by various artistic achievements and scientific developments are related to cultural advancement and social change.

5. The child predicts some potential consequences in terms of cultural advancement and social change that might result from current artistic achievements and scientific developments.

Teaching behaviors

1. The teacher communicates to pupils basic information relevant to beginning a study of this area.

2. The teacher establishes related activities and tasks for pupils and guides them to participate in these activities and tasks.

3. The teacher provides relevant resources as needed to further activities and understandings.

4. The teacher demonstrates an adequate understanding of these elements by using them properly to establish illustrative relationships.

5. The teacher observes pupils' performance in this area and assesses their progress in this area.

6. The teacher summarizes major points with pupils' aid and presents situations for further application.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of major factors and forces as related to various developments and an ability to set expectations and communicate essential preparatory information.

2. Knowledge of points of interrelation among these variables and an ability to present instances which illustrate these points.

3. Knowledge of relevant training tasks and resources and an ability to initiate activities involving these tasks and resources at appropriate times.

4. Knowledge of observational and assessment techniques and an ability to use these techniques to evaluate pupil performance.

5. Knowledge of more complex instances of these elements and an ability to assist pupils to apply learned understandings to these instances.

SPECIFICATION WORKSHEETS FOR

BEHAVIORS IN ART

Objectives for the Elementary School

Art Program

1. To develop levels of skill in the use of art processes appropriate to the child's capacity.

2. To develop understanding, creativity, and confidence in using a variety of art media to communicate thoughts and feelings.

3. To stimulate the use of imaginative and inventive approaches to the solution of art problems, and to increase the perceptual power (use of visual and tactile senses) in interpreting observations creatively for artistic expression.

4. To develop competent creative and appreciative experiences that will stimulate enduring interest, constructive response to the work of others, lifelong enjoyment, and improvement of quality of art as applied to leisure activity.

5. To develop understanding and insights into the principles and concepts of design, variety of art forms, and the process involved in art.

6. To develop facility in the appropriate artistic vocabulary necessary to express artistic expression, understanding, and appreciation of art objects, art problems, and art experiences.

7. To develop an appreciation of art as a universal expression in nature and daily life that is carried on in a highly individualized manner, as evidenced in all ages and cultures of all mankind.

8. To help develop insight into the inventions, styles, characteristics, and cultural backgrounds of artists so that the child becomes a discriminatory producer and consumer of art through the development of his personal standards and aesthetic taste.

Objective #1

To develop levels of skill in the use of art processes appropriate to the child's capacity.

Pupil learning behaviors

1. The pupil experiments, tests, and extends his control of the medium he is using to achieve the qualities that can embody his ideas in visual form.

2. The pupil "thinks" with his medium and increases his ability to anticipate what his ideas might look like in visual materials.

3. The pupil utilizes knowledge to experiment, test, and extend his control of media, tools, and techniques in order to achieve the visual qualities that can embody his ideas.

4. The pupil deliberately tries and invents new ways of working with media and tools.

5. The pupil achieves the facility to use and command the tools and materials to portray his ideas.

Teaching behaviors

1. The teacher compares selected works of art which contain similar qualities, but are executed differently or with different media to demonstrate how tools and media can be used and controlled.

2. The teacher demonstrates and describes various techniques artists use to produce specific qualities and feelings.

3. The teacher describes and demonstrates ways that ideas might be given visual form with the various media, tools, and techniques available.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Opportunities to become facile with art tools, media, and techniques.

2. Opportunities to become competent to instruct in the use of these media, tools, and techniques.

Objective #2

To develop understanding, creativity, and confidence in using a variety of art media to communicate thoughts and feelings.

Pupil learning behaviors

1. The pupil demonstrates that he has acquired knowledge about media, tools, and techniques.

2. The pupil demonstrates that he understands that practice leads to control and this enables achievement of intended visual qualities.

3. The pupil utilizes his knowledge of art processes in reconstructing, extending, and refining his own ideas in visual forms.

Teaching behaviors

1. The teacher explains how visual qualities achieve accord for the feeling and ideas one gets from the art work.

2. The teacher shows, by using selected works of art, and discusses how materials and techniques will give specific visual qualities.

3. The teacher invites children to experiment and practice different ways to utilize media, tools, and techniques.

4. The teacher compares and interprets examples of artists' works to point out similarities in the sources to which they turn for ideas, and shows how children can use these same ideas.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Ability to utilize the various media, tools, and techniques of art.

2. Ability to visualize perceptions, feelings, attitudes, etc. with the media and techniques of the artist.

Objective #3

To stimulate the use of imaginative and inventive approaches to the solution of art problems, and to increase the perceptual power (use of visual and tactile senses) in interpreting observations creatively for artistic expression.

Pupil learning behaviors

1. The pupil learns the ways that artists garner ideas during their lives (holidays, dreams, myths, fantasies, and views of land, sea, sky, people, animals, etc.) in order to visualize the beginning of an idea.

2. The pupil expresses his own ideas about his feelings and perceptions and attempts to explore their meanings.

3. The pupil seeks to explore how artists work and develop their ideas by reading, looking at sketches, and viewing art, art forms, and films.

Teaching behaviors

1. The teacher demonstrates how to extend and test control of tools and media to produce the visual qualities which best portray ideas.

2. The teacher directs attention to an object or event in the environment of the child and describes it to reveal alternate ways it can be perceived.

3. The teacher demonstrates ways that perception can be altered, modified, extended, or refined to present a new point of view.

4. The teacher encourages children to learn how to use their own ideas in order to visualize them.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Familiarity with various art techniques and the methods of perception and visual portrayal.

Objective #4

To develop competent creative and appreciative experiences that will stimulate enduring interest, constructive response to the work of others, lifelong enjoyment, and improvement of quality of art as applied to leisure activity.

Pupil learning behaviors

1. The pupil relates his inner feelings as he perceives aspects of his environment.

2. The pupil deliberately seeks to reach for and choose a different way of seeing and portraying ideas visually.

3. The pupil understands and visualizes such visual effects and qualities as "fuzziness, crispness, murkiness, brilliance, softness, hardness, etc."

Teaching behaviors

1. The teacher compares visually and describes how artists' work on the same subject differ.

2. The teacher directs attention to books, studies, sketches, models, pictures, etc. that explain and compare the variety of ways artists improvise, extend, and refine their ideas.

3. The teacher encourages the study of art, artists, and other student's work to develop appreciation and critical tastes for leisure time activity.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Awareness of, and appreciation for, the implication of discerning art taste for lifelong leisure time enjoyment.

Objective #5

To develop understanding and insights into the principles and concepts of design, variety of art forms, and the process involved in art.

Pupil learning behaviors

1. The pupil searches for feelings, meanings, and appropriate analogies to interpret qualities that he perceives in his own work and in the work of artists.

2. The pupil evidences joy in constructing imaginative analogies to characterize and interpret the form and quality of his feelings, and uses these as keys to the possible meaning and significance of the work.

3. The pupil is willing to modify and change his judgment in the light of new experience and information.

Teaching behaviors

1. The teacher constructs analogies to interpret how various qualities in a work might remind children of something else, makes them feel a certain way, and suggests how something might have been made.

2. The teacher explains societal conditions and cultural values which account for symbols and forms in any given work of art.

3. The teacher demonstrates the concepts of design, art forms, and processes of art.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of all types of art and art forms, their historical development, cultural implications and the processes involved.

Objective #6

To develop facility in the appropriate artistic vocabulary necessary to express artistic expression, understanding, and appreciation of art objects, art problems, and art experiences.

Pupil learning behaviors

1. The pupil adds new words to his vocabulary and uses their definitions for more precise description, explanation, and interpretation of qualities he perceives in works of art.

2. The pupil extends his ability to perceive a range of qualities in works of art, and learns to describe those qualities with great precision.

3. The pupil is able to explain intelligently features of his own work and the work of artists.

4. The pupil develops confidence in his judgments.

Teaching behaviors

1. The teacher assists in developing criteria (points of view) for judging art work and how description and interpretation can lead to different criteria.

2. The teacher encourages children to express their feelings and opinions of art within the framework of their knowledge and abilities.

3. The teacher uses appropriate vocabulary and gestures to draw attention to visual qualities in the environment and art.

Suggested specifications for a teacher education program

A teacher education program will provide a student with:

1. The ability to be facile in the use and meanings of artistic vocabulary and its descriptive use.

2. Awareness of artistic criteria and truly individual "points of view."

Objective #7

To develop an appreciation of art as a universal expression in nature and daily life that is carried on in a highly individualized manner, as evidenced in all ages and cultures of all mankind.

Pupil learning behaviors

1. The pupil demonstrates his discovery that his feelings can be shaped by the qualities he perceives.

2. The pupil tries out different criteria (points of view) in making judgments about his work and the works of others.

3. The pupil seeks to find out more about art history through books, art works, and other media.

Teaching behaviors

1. The teacher encourages children to interpret qualities they see in their own works and in natural and man made forms in their environments.

2. The teacher reviews judgments of children to demonstrate that they must be tentative in light of new knowledge, new insights, and extended perceptions.

3. The teacher increases children's tolerance for the ways other people perceive and form visual representation of these perceptions through the artistic form.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. An awareness of individual "tastes" and appreciations.

2. An awareness of nature and with ways of perceiving natural and man made objects.

3. Opportunities to be cognizant of art culture and history.

Objective #8

To help develop insight into the intentions, styles, characteristics, and cultural backgrounds of artists so that the child becomes a discriminatory producer and consumer of art through the development of his personal standards and aesthetic taste.

Pupil learning behaviors

1. The pupil describes the qualities he perceives in his own work and the work of artists.

2. The pupil forms practical methods in making judgments and understands how he arrived at them.

3. The pupil searches for explanations of aspects of art, in his own and other artists' work, which he does not understand.

4. The pupil evidences that he has developed criteria for judging art by looking at, describing, and interpreting specific works of art.

5. The pupil utilizes his knowledge of criteria to demonstrate, justify, and defend his own judgments of his work and of others' works.

Teaching behaviors

1. The teacher clearly identifies criteria for judgments and their appropriateness for specific types of works of art.

2. The teacher helps children perceive and engage in meaningful talk about art and artists.

3. The teacher assists in the discovery of values in art of our own age, and from other eras, and its lifelong value in their own lives.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of art history.

2. Sensitivity to criteria and points of view.

3. Knowledge in the child's perceptions, growth, and development.

4. Proficiency in artistic vocabulary.

SPECIFICATION WORKSHEETS
FOR BEHAVIORS IN MUSIC

Objectives for the Elementary School

Music Program

1. To understand music as a tonal art form composed of melodic lines, rhythms, and harmonies.

2. To understand the scientific construction of music with its formal notational system.

3. To be aware of the historical development of music, its impact on peoples and lands, its current place in the world, and its relationship to our lives today and tomorrow.

4. To develop standards for critical listening, participation, and selectivity of our musical fare.

5. To develop the musical skills in performance in order to understand music more perfectly. In some cases to carry these skills through life as an avocation, if not a vocation.

6. To be able to react to musical stimuli, emotionally and physically, as a satisfying experience.

7. To appreciate the creative aspects of music and to feel free to create music.

8. To love music to the end that the learner will desire to continue his musical experiences.

9. To be able to delineate between the various sounds of the standard orchestral families, specific musical instruments, types of human voices, and/or unorthodox singing and musical instruments.

10. To develop skills in musical notation.

11. To provide opportunities for the discovery and the growth of musical talent.

Objective #1

To understand music as a tonal art form composed of melodic lines, rhythms, and harmonies.

Pupil learning behaviors

1. The pupil recognizes and explains the different parts of a selection identifying melody, rhythm, and harmony.

2. The pupil demonstrates by attentive listening and sometimes by physical and/or emotional reaction, that he is aware of the mood of the music expressed by the composer and performers.

3. The pupil recognizes the design in muisc by identifying repeated melodies, rhythms, harmonies, and the introduction of new ones.

Teaching behaviors

1. The teacher provides opportunity for the child to hear and respond to music from the simplest single line melody to the most intricate polyphonic, polyrhythmic styles.

2. The teacher selects music and musical opportunities that express strong emotional ideas (patriot, morose, gay, etc.).

3. The teacher consciously strives to enlarge the child's knowledge of music structure by providing for opportunities for the child to hear and interpret design in music.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of the recorded and taped music available to demonstrate melody, rhythm, harmony, and design in music.

2. Experience in observing children react physically and emotionally to music.

3. Knowledge in music design and appreciation of the composer's art.

Objective #2

To understand the scientific construction of music with its formal notational system.

Pupil learning behaviors

1. The pupil recognizes the basic music notations such as sharps, flats, key and meter signatures, musical terms, and symbols.

2. The pupil understands and demonstrates the great staff with its component parts of treble clef and bass clef staffs.

3. The pupil relates the names of various lines and spaces of the staff for identification purposes.

4. The pupil defines the differences in values of the various notes and rests, measure markers, etc., and understands the mathematical precision in music construction.

5. The pupil explains the pitch relationship to vibrations per second and the presence of typical and qualitive sound.

Teaching behaviors

1. The teacher provides the child with charts, projectiles, etc. that demonstrate visually the various notational symbols used and explains their relationship to musical sound and performance.

2. The teacher demonstrates through use of scientific and musical equipment the relationships of musical sound and its scientific construction acoustically.

3. The teacher demonstrates the presence of quality and timbre, and identifies various sounds on different musical instruments and objects.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Opportunities to study and learn the scientific relationship of musical sound and its notational system.

2. Knowledge of the system of notation of music for interpretive and rhythmic purposes.

3. A source of materials and media for the demonstration of the musical, scientific, and arithmetical construction of music.

Objective #3

To be aware of the historical developm ent of music, its impact on peoples and lands, its current place in the world, and its relationship to our lives today and tomorrow.

Pupil learning behaviors

1. The pupil identifies specific composers and their style, period, and cultural traditions with their music.

2. The child appreciates the music of other cultures and places proper significance on the influence of music in these people's lives.

3. The pupil discovers the relationships between music and other human endeavors, such as literature and the social sciences.

4. The pupil relates music to man's historical development.

5. The pupil evaluates the place of music in contemporary society as it relates to the community through church, school, and organizations.

Teaching behaviors

1. The teacher utilizes media, historical charts, references, etc. to present to the child the historical and cultural developments of man through music.

2. The teacher emphasizes the differences and great works of music in the cultures and the part and effect of these cultures on music.

3. The teacher helps the child discover the kinship of other disciplines to music.

4. The teacher calls to the attention of the children the need for, and use of, music in our culture and, specifically, our community.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. A wide knowledge of the historical and cultural impact of music.

2. Opportunities to place music in perspective as it is currently used locally, nationally, and internationally.

3. Opportunities to develop within the teacher historical perspective, appreciation and awareness of music.

Objective #4

To develop standards for critical listening, participation, and selectivity of our musical fare.

Pupil learning behaviors

1. The pupil develops an understanding of standards for judging the quality of music and musical performance.

2. The pupil recognizes the various musical forms, idioms, styles, and moods.

3. The pupil recognizes the functional use of music for commercial purposes.

4. The pupil makes intelligent selections of musical fare based on musical knowledge.

Teaching behaviors

1. The teacher encourages the student to attend musical performances and to listen to musical recordings for the purpose of critical analysis.

2. The teacher defines the musical forms, idioms, styles, and moods by definition and models.

3. The teacher asks the child to analyze and criticize the functional uses of music.

4. The teacher seeks information from the child on his musical choices.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. A background in musical appreciation so that she might be cognizant of musical worth.

2. Encouragement to attend and evaluate musical performances in order to critically analyze them.

3. Opportunities to analyze and evaluate the functional aspects of music and musicians.

Objective #5

To develop the musical skills in performance in order to understand music more perfectly. In some cases to carry these skills through life as an advocation, if not a vocation.

Pupil learning behaviors

1. The pupil learns to sing in a way that is satisfying to himself.
2. The pupil demonstrates ability in carrying a part in group singing.
3. The pupil performs on a musical instrument and is familiar with the piano keyboard.
4. The pupil indicates his desire to continue his musical experiences by performing on his own.
5. The pupil develops a repertoire of music for use in singing and playing.
6. The pupil develops an understanding of standards to be used in judging the quality of musical performance.

Teaching behaviors

1. The teacher provides opportunities for the child to sing and play (pre-band, band, keyboard and orchestral instruments).
2. The teacher encourages all children to continue singing and playing and, especially, directs those with talent toward more formal study.
3. The teacher develops with the child a usable repertoire of music for special occasions and general enjoyment.
4. The teacher provides opportunities for the child to hear quality performances of musical fare (choruses, bands, soloists, pianists, etc.).

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Knowledge of the skills of singing, playing band and orchestral instruments, pre-band instruments, and keyboard.
2. Ability to discern latent musical talent.
3. Opportunities to experience the joys and agonies of learning and performing musically.
4. Opportunities to develop a repertoire of music for singing.

Objective #6

To be able to react to musical stimuli, emotionally and physically, as a satisfying experience.

Pupil learning behaviors

1. The pupil demonstrates the ability to concentrate on musical sound.

2. The pupil responds creatively to music and rhythms (as in dancing, drawing, describing verbally, etc.).

3. The pupil reacts to the emotional appeal of music (e.g., dalming down, wanting to march, acting frightened).

4. The pupil defines how music makes him feel (e.g., spirited, patriotic, etc.).

5. The pupil resorts to music as a source of satisfaction, change of pace, and mood preparation.

Teaching behaviors

1. The teacher provides facilities and opportunities for children to select class listening and participation music.

2. The teacher provides facility and opportunity for individual listening selection and enjoyment.

3. The teacher listens and observes children's reactions to music.

4. The teacher encourages physical and emotional response to music.

Suggested specifications for a teacher education program

A teacher education program will provide students with:

1. Materials, repertoire lists and suggestions for class and individual musical fare.

2. Training in recognizing children's responses to music.

3. Encouragement to provide for and allow the individual selection, reaction to, and absorbtion of musical fare.

Objective #7

To appreciate the creative aspects of music and to feel free to create music.

Pupil learning behaviors

1. The pupil recognizes and understands the music of different composers.

2. The pupil tries his hand at making music by either singing, playing, embellishing, or creating music of his own.

3. The pupil experiments with music in creating, altering, trying or observing its effects on himself and others.

4. The child looks for musical activities in which he can participate creatively (musical plays, chorus, etc.).

Teaching behaviors

1. The teacher utilizes the various sources of music history, appreciation, and recordings to encourage the child to know and understand the composers and their music.

2. The teacher applies various techniques to involve the child in creating music of his own.

3. The teacher encourages children to write, direct, and compose their own musical stories, games, plays, etc.

4. The teacher provides opportunities for the child to participate in creative musical performances.

Suggestes specifications for a teacher education program

A teacher education program will provide the student with:

1. A thorough background and resources in the lives and music of composers.

2. Knowledge in the techniques of creative music and the materials that provide opportunities for creative musical performance.

3. Training in recognizing and encourageing creativity in music.

Objective #8

To love music to the end that the learner will desire to continue his musical experiences.

Pupil learning behaviors

1. The pupil exhibits interest in attending concerts and performances of soloists; he, also, listens when possible to radio and television and recordings of music.

2. The pupil looks for opportunities to participate in sing-ins, and community and church music.

3. The pupil reads about and talks about music and musicians.

Teaching behaviors

1. The teacher arranges for time for a child to present discussion on music he has heard, concerts attended, or musical groups he has participated in.

2. The teacher encourages the child to share his musical talent or knowledge with the class.

3. The teacher encourages the child to carry on his interest and enjoyment of music in and out of school.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. An understanding of music as a source of satisfaction and the thrill of performance, or of experiencing good performances vicariously.

Objective #9

To be able to delineate between the various sounds of the standard orchestral families, specific musical instruments, types of human voices, and/or unorthodox singing and musical instruments.

Pupil learning behaviors

1. The pupil identifies the standard common band and orchestral instruments by sound (within their standard range) and by sight.

2. The pupil distinguishes between human voices (soprano, alto, tenor and bass) in their standard range and defines in one, two, three, or more voices are singing simultaneously.

3. The pupil associates certain sounds of specific instruments and voices with specific characters of styles (bass horn with male bass, picolo with high soprano, etc.).

4. The pupil develops discrimination in selecting musical fare based on his knowledge of musical sounds, effects, skills and artistry.

Teaching behaviors

1. The teacher provides opportunities for the child to see and hear specific musical instruments, voices, etc. in solo and group performances.

2. The teacher encourages the studying of musical literature on prominent performers and groups

3. The teacher helps the child formulate opinion on quality, difficulty, and integrity of performances.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Opportunities to direct the teacher in the critical appraisal of musical performances and the difficulties involved.

2. Information on the available source of musical sound study.

3. Opportunities to develop within the teacher the appreciation of good musical performance and an understanding of the performer's art.

Objective #10

To develop skills in musical notation.

Pupil learning behaviors

1. The pupil reads and interprets musical notation (as in tempo, volume, etc.).

2. The pupil responds appropriately to musical notation (as in singing or playing).

3. The child follows a simple score of a musical composition as he listens to a recording, or listens to and observes a performance.

4. The pupil uses musical notation to express his feelings or desires and to create music.

5. The pupil recognizes and explains the uses and purposes of various musical notational symbols.

Teaching behaviors

1. The teacher organizes a program of study around musical notational symbols.

2. The teacher requires the child to react properly to musical notational codes.

3. The teacher provides opprotunities for the child to read and interpret music and musical scores.

4. The teacher encourages the child to practice the skills of musical notation in creating music.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. A thorough training in musical notation and its interpretation and purposes.

2. Ability to respond to musical coding as in sight singing and playing.

3. Experience in reading musical scores accompanying performances.

4. A usable knowledge of the techniques of teaching sight singing and playing from written notation.

Objective #11

To provide opportunities for the discovery and the growth of musical talent.

Pupil learning behaviors

1. The pupil has the opportunity to study a musical instrument and/or sing beyond the classroom exposure.

2. The pupil experiments with several kinds of musical instruments.

3. The pupil possibly is part of a regularly organized band, orchestra or chorus.

4. The pupil has released time for serious study and instruction in musical performance.

Teaching behaviors

1. The teacher observes and encourages the child with inclination for, and ability in, music.

2. The teacher allows the child to foster his talent and desire for music.

3. The teacher encourages the school to develop performing groups and special instruction for the musically talented.

Suggested specifications for a teacher education program

A teacher education program will provide the student with:

1. Training the teacher in sensitivity to musical ability.

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*All listed bulletins are unpublished mimeographed working papers prepared in 1968 by the GEM project staff at the College of Education, University of Georgia, Athens.

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